58151.U1

REMARKS

Claims 1-22 are pending in the application. In the non-final office action of 5/16/2005 Claims 11-22 were allowed, claims 1-4, 6 and 10 were rejected and claims 5 and 7-9 were objected to. the drawings were accepted. The examiner is thanked for his indication of allowance for both the allowed claims and the claims subject to an objection. Reconsideration and allowance is requested in view of the amendments and remarks set forth below.

Claim 1 was rejected under 35 USC 103 as being obvious over Hopkins et al., 6507765 in view of Bechhoefer et al., 20030065482. This rejection is respectfully traversed.

In part, claim 1 defines an analyzer that includes a conditioning circuit with a qualifying circuit for a tachometer signal. Claim 1 provides for producing a qualified tachometer signal when the raw tachometer signal is qualified based on predetermined criteria. The terms "qualified" and "raw" are used only as a convenient names for the signals and are not intended to have any intrinsic meaning. However, the term "tachometer" does have intrinsic meaning and a raw tachometer signal also will have intrinsic meaning. A raw tachometer signal includes tachometer pulses, noise and and possibly spurious pulses. The claim preamble has been amended to state this environment of the invention in this language. The body of the claim has been amended to provide that the predetermined criteria distinguish between pulses of the tachometer signal and spurious pulses. This environment and function were set forth in the description of the application and read in context, the original claim 1 included the claimed functional limitation. However the amended claim is intended to be more clear in this regard. Thus, the claim now states that qualified tachometer signal is produced in response to tachometer pulses and is not produced in response to spurious pluses in the raw tachometer signal.

The examiner cites paragraphs 89 and 90 of Bechhoefer et al., 20030065482 as showing "a qualified analog signal being produced when the raw analog signal is qualified based on predetermined criteria." Those paragraphs are quoted below for convenient reference.

[0089] What will now be described are the different indicators that may be included in an embodiment of the DQ algorithm. ADC Bit Use measures the number of ADC bits used in the current acquisition. The ADC board is typically a 16 bit processor. The log base 2 value of the maximum raw data bit acquired is rounded up to the next highest integer. Channels with inadequate dynamic range typically use less than 6 bits to represent the entire dynamic range. ADC Sensor Range is the maximum range of the raw acquired data. This range cannot exceed the operational range of the ADC board, and the threshold value of 32500 is just below the maximum permissible value of +32767 or -32768 when the absolute value is taken. Dynamic Range is similar to the ADC Sensor Range, except the indicator reports dynamic channel range as a percent rather than a fixed bit number. Clipping indicates the number of observations of clipping in the raw data. For a specific gain value, the raw ADC bit values cannot exceed a specific calculated value. Low Frequency Slope (LowFreqSlope) and Low Frequency Intercept (lowFreqInt) use the first 10 points of the power spectral density calculated from the raw data and perform a simple linear regression to obtain the intercept and slope in the frequency-amplitude domain. SNR is the signal to noise ratio observed in each specific data channel. A power spectral density is calculated from the raw uncalibrated vibration data. For each data channel, there are known frequencies associated with certain components. Examples include, but are not limited to, gear mesh frequencies, shaft rotation rates, and indexer pulse rates. SNR measures the rise of a known tone (corrected for operational speed differences) above the typical minimum baseline levels in a user-defined bandwidth (generally +/-8 bins).

[0090] The Statistics (ST) algorithm 360 is associated with producing a plurality of statistical indicators 360a. The Root-Mean-Square (RMS) value of the raw vibration amplitude represents the overall energy level of the vibration. The RMS value can be used to detect major overall changes in the vibration level. The Peak-To-Peak value of the raw vibrating amplitude represents the difference between the two vibration extrema. When failures occur, the vibration amplitude tends to increase in both upward and downward directions and thus the Peak-To-Peak value increases. The Skewness coefficient (which is the third statistical moment) measures the asymmetry of the probability density function (p.d.f.) of the raw vibration amplitude. Since it is generally believed that the p.d.f. is near Gaussian and has a Skewness coefficient of zero, any large deviations of this value from zero may be an indication of faults. A localized defect in a machine usually results in impulsive peaks in the raw vibration signal, which affects the tails of the p.d.f. of the vibration amplitude. The fourth moment (Kurtosis) of the distribution has the ability to enhance the sensitivity of such tail changes. It has a value of 3 (Gaussian distribution) when the

58151.U1

machinery is healthy. Kurtosis values larger than 3.5 are usually an indication of localized defects. However, distributed defects such as wear tend to smooth the distribution and thus decrease the Kurtosis values.

Paragraph 89 is a list of a variety of calculations and checks used to evaluate the data quality of a signal. Some deal strictly with making sure that data that has been digitized by an A/D circuit has not been corrupted due to signal overloads, bit corruption, and other hazards associated with converting analog signals to digital data. Many are standard measures of signal quality, such as Signal_to_Noise Ratio and Dynamic Range calculations. There is some mention of using vibration data converted to the frequency domain and evaluating the amplitudes at certain frequency bands, but this is standard practice for machine condition evaluation.

Paragraph 90 speaks of various statistical algorithms being applied to vibration data. Calculating RMS and Peak_to_Peak values are common calculations for vibration analysis. The other items mentioned are other statistical calculations that can be done on vibration data to detect certain defects. In the context of this document these statistical indicators will be used to qualify the condition of the machine being monitored. Paragraph 91 lists the data types that these statistical algorithms would be performed on and there is no mention of using these statistical algorithms on a tachometer signal, only on vibration data.

Nothing in paragraphs 89 and 90 suggests doing anything to qualify a tachometer signal, which is required by Claim 1. There is no teaching in this reference to distinguish between a tachometer pulse and a spurious pulse, as required by claim 1. There is no teaching to produce a qualified tachometer signal in response to tachometer, but not produce the tachometer signal in response to spurious pulses, both of which are required by claim 1. In view of these distinctions, it is respectfully submitted that Claim 1 defines over this reference and allowance is requested.

Claim 6 was also rejected as being obvious over Hopkins et al., 6507765 in view of Bechhoefer et al., 20030065482. This rejection is respectfully traversed.

The office action points to col. 7, lines 4-39 of Hopkins et al., 6507765 as showing a selectable attenuator circuit for attenuating the raw analog signal when the

input limit is exceeded. The applicant disagrees with this interpretation of Hopkins. For convenient reference, the cited portion of Hopkins is reproduced below.

> The CIMCIS terminal 36 processes the data signal signals 102 and makes numerous determinations of machine performance based thereon. An operator may select one of a plurality of screens for display on the CIMCIS terminal 36, and the terminal can be programmed to inform the operator of the corrective action required, and to confirm, via eavesdropping, that such corrective action has actually occurred. In one aspect of the invention, the CIMCIS terminal 36 processes the signals of FIG. 2 to determine when the processing machine 16 is in one of four states. These four states are illustrated in FIG. 3, and include an IDLE state 120, a RUN state 122, a WAIT state 124, and a STOP state 126. These machine states are included in a summary screen presented on an LCD display of the CIMCIS terminal 36. FIG. 4 illustrates the basic data operation of the CIMCIS terminal 36 that allows determination of the machine states shown in FIG. 3 and which forms the basis of other data presented in other screens. The CIMCIS terminal 36 receives eavesdropped data in block 130 corresponding to the universal error model of FIG. 2, translates that data from the communication code used by the particular machine host computer 18,(block 134), and attaches the real time to a data record including the translated code (block 136). Next the translated data record is sorted according to the universal machine model of FIG. 2 and stored in an appropriate memory element (block 138). From the stored data, various parameters relating to performance of the processing machine 16 are calculated and displayed according to the particular display selected by a machine operator (block 140). These parameters are stored and displayed as necessary (block 142). For example, by comparing the time of a data record indicating that the processing machine 16 is loading a PCB to the time of a subsequent data record indicating that the processing machine 16 is unloading the PCB, the cycle time of the processing machine 16 is calculated for display as part of the summary screen.

As may be observed from the above quote, there is no discussion of an input limit applied to a tachometer signal in the cited passages. There is no teaching of a doing something when the input limit is exceeded, and specifically there is no teaching in the cited passages of an attenuator that attenuates a tachometer signal when the input limit is exceeded, as required by claim 6. In view of these

Page 15 of 16

58151.U1

distinctions, it is respectfully submitted that claim 6 defines over the cited references and should be allowed.

Claims 2-4 and 10 were rejected as being obvious over 3 cited references, and such rejection is respectfully traversed. Claims 2-4 and 10 are dependent on claims 1 and 6, respectively, and define additional important aspects of the invention that, in combination with the elements of the parent claims, are not suggested by the cited references. Therefore, allowance of claims 2-4 and 10 is requested.

Applicant thanks the examiner for the indication that claims 5 and 7-9 are patentable. In view of the allowability of the parent claims as discussed above, it is believed unnecessary to rewrite these claims in independent form.

Applicant also thanks the Examiner for the indication that claims 11-22 are allowed.

The examiner is further thanked for his thorough and complete examination of the claims and his clear citation of references against the claim elements. The clarity of the office action made it easy to understand the office action and amend the claims as needed to satisfy the examiner's concerns and interpretations of the claims. If the examiner believes that a conversation with the undersigned would facilitate an early disposition of this case, he is respectfully requested to call the undersigned.

In the event this response is not timely filed, applicants hereby petition for the appropriate extension of time and request that the fee for the extension be charged to deposit account 12-2355. If other fees are required by this amendment, such as fees for additional claims, such fees may be charged to deposit account 12-2355. Should the examiner require further clarification of the invention, it is requested that s/he contact the undersigned before issuing the next office action.

Sincerely,

LUEDEKA, NEELY & GRAHAM, P.C.

By:

Andrew S. Neely 28,979

2005.08.16

Page 16 of 16